I have been able to collect from the literature 34 cases in which nephrotomy was performed with 28 recoveries (82 per cent.), and 27 cases of nephrectomy with 25 recoveries (92 per cent.). It is, of course, unfair to draw conclusions from these statistics, since the cases vary greatly in severity. If the condition occurs during pregnancy conservative operation is indicated. If the condition is a part of a general pyemia extirpation of the kidney is out of the question.

GASTRIC ULCER IN CHILDHOOD.

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The following case of hematemesis occurring in a child of eight years has been of considerable interest, on account of its apparent rarity, and caused me to study the subject of gastric ulcer in childhood:

B. L., white, female, has been attending school, and living under excellent conditions of sanitation and nutrition. The family history is negative. The child was breast-fed, and well nourished in infancy. At the age of two years she had a rather severe attack of acute gastritis attended with fever and persistent vomiting for several days. She also had German measles, but otherwise none of the infectious diseases of childhood. For several years she has been "taking cold" easily, having several attacks of bronchitis every winter.

Her present trouble is of about ten weeks' duration. She suffers with repeated attacks of pain in the epigastric region. The pain occurs in paroxysms both before and after meals. Often it begins before meals, is relieved for a short time by taking food, and then returns sharper than before. It persists then a varying time, from one to three hours. At times it comes on in the midst of a meal. Sometimes it disappears quite suddenly. While in my office on the first examination she suddenly became nauseated and vomited, without apparent effort, food streaked with blood. The vomited matter gave the reaction for free hydrochloric acid. One week later, during an attack of pain, she again became nauseated and vomited about an ounce of bright blood.

The patient is rather frail and pallid. She weighs 42 pounds. The lungs and heart are normal. There is marked tenderness to pressure in the epigastrium. The stomach area is normal on percussion. The liver dulness is normal. The spleen is not palpable. There is no tenderness over the rest of the abdomen.

Examination of the blood revealed hemoglobin, 72 per cent. (Gowers); red cells, 4,200,000; whites, 8200. The urine was normal. The stools after the first appearance of blood in the vomit showed blood with the turpentine-guaiac test. After the second appearance occult hemorrhage persisted for four days. Subsequent examinations failed to show its presence.

The patient was put to bed on a five weeks' ulcer cure. All food was withheld for thirty-six hours, after which diluted milk and bismuth were given. The stomach symptoms disappeared after the first three days, and remained absent during the entire course of treatment. Since then, a period of five months, the child has been free from symptoms and has gained steadily in weight.

From the symptoms, the attacks of gastralgia, epigastric tenderness, hematemesis, the presence of blood in the stools, and the result of treatment, the diagnosis of ulcer of the stomach is, I think, justifiable.

A study of the postmortem statistics shows that ulcer in children is absolutely and relatively of uncommon occurrence, as compared with its incidence in adults. Thus, in Welch's[1] collection of 607 cases of gastric ulcer, but one occurred in a child less than ten years of age. Lebert[2] found but one case in his series of 226. By Rehn[3] we are told that Rokitansky never encountered a case under fourteen years, and was himself, in 1873, able to collect but 9 cases in children. Fenwick[4] collected 18 cases, and Cutler[5] in 1904 added 11 cases. It must be remembered that these statistics have been gained largely from hospitals where postmortem examinations on children are comparatively infrequent. An examination of the statistics of children's hospitals shows a somewhat different result. Dusser[6] found ulcer in the stomach in 9 cases; and ulcer of the duodenum in 4. In 390 autopsies at the Babys' Hospital in New York, Martha Wollenstein[7] found 5 cases of gastric ulcer. Holt[8] reports 3 cases accompanying follicular gastritis and 5 accompanying general tuberculosis. In order to obtain data as to its occurrence clinically, besides consulting the text-books on diseases of children, I wrote to the leading pediatrists of this country, with the following results: Booker, Rotch, Griffith, Louis Starr, and Koplik have never seen a case that they recognized clinically. Koplik[9] reports one case seen at autopsy accompanying empyema, which he states represents his experience covering fully 300,000 cases of diseases in children.

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[1] Pepper's System of Medicine.
[2] Krankheiten d. Magens, 1878.
[3] Jahrb. f. Kinderheilkunde, 1873, p. 19.
[4] Disorders of Digestion in Infancy and Childhood, London, 1897.
[5] Transactions Amer. Gastroenterolog. Soc., 1904.
[6] Thèse de Paris, 1890. Cited by Holt, Diseases of Children.
[7] Cited from Osler, Practice of Medicine.
[8] *Diseases of Children and Personal Communication.*
[9] Ibid.

Jacobi,[10] on the other hand, states that it is not quite uncommon in children from seven to thirteen years. From the statistics of the children's hospital it appears that it occurs oftener than it is recognized clinically.

VARIETIES OF ULCERATION. Fenwick recognizes five varities of gastric ulcer: (1) Hemorrhagic erosions, (2) follicular ulceration, (3) tuberculous ulcers, (4) malignant ulcers, and (5) simple ulcer. The last may be either acute or chronic.

(1) *Hemorrhagic extravasations* into the gastric mucosa are frequently noted in children, as in adults. They are observed as the result of congestion of the vessels of the mucosa, secondary to uncompensated valvular disease or to dilated heart, complicating chronic pulmonary trouble, or more rarely in cirrhosis of the liver. They have also been seen in the hemorrhagic diseases, as purpura, scurvy, leukemia, hemophilia, and in jaundice. The hemorrhages vary from minute points, barely detectable by the naked eye, to irregular oval or linear areas. The smaller are limited to the mucosa, while the larger effusions may involve all the coats. This condition is of pathological rather than clinical interest. As will be seen later, Kundrat[11] considers the true ulcers to have their origin in the necrosis of the hemorrhagic areas.

(2) *Follicular ulceration* occurs for the most part in infants as the result of follicular gastritis. According to Fenwick: "Here and there small hemispherical masses about the size of a pin's head may be observed upon the surface of the mucous membrane. These appearances are due to inflammation of the solitary lymph glands situated in the wall of the stomach, and it is from the necrosis of these structures that the ulcers are produced. The swollen gland presses upon the gastric tubules which surround and cover it in, and gradually causes destruction of those in the immediate vicinity. A minute abscess is formed which opens on the surface." The disease seldom extends deeper than the submucous coat, but occasionally the muscular and the serous coats become involved.

According to Holt, these ulcers give rise to no symptoms other than those of the attendant gastritis, as a rule; he has, however, seen three fatal cases from hemorrhage occurring in young infants. The ulcers in these cases resembled those found in the intestines in follicular enteritis.

(3) *Tuberculous Ulcers.* Ulceration of the stomach due to tubercle is apparently less rare in children than in adults. Steiner and Neureutter met with 4 cases in 302 autopsies on tuberculous children. Widerhofer noted it twice in 418 cases, while Holt reports 5 cases in 119 autopsies in tuberculous children, but states that there is no positive evidence that the ulcers were the result of

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[10] Diseases of Children.

[11] Gerhardt's Handbuch der Kinderkrank., 1880.

tubercle. Together this is a total of 11 cases of ulcer in 839 cases, as against Durk's[12] findings of but 4 cases in 900 autopsies on tuberculous subjects.

(4) *Malignant ulcer,* or rather the occurrence of carcinoma on the basis of a gastric ulcer in childhood, is unknown.

(5) *True peptic ulcer* in children is either acute or chronic. Morphologically they do not differ essentially from those seen in adults. Kundrat states that recent ulcers differ from those in adults only in that they are not always round, varying from a hempseed to a lentil in size. Their pathogenesis is as little definitely understood as in adults, though certain of the causes which are given to explain their occurrence can hardly be accepted as operable in children; such as hyperacidity and degeneration of the bloodvessels of the mucosa. Kundrat considered them the result of hemorrhagic effusions in the mucosa, destroying its vitality and permitting autodigestion by the gastric juice. He says: "If, as is commonly considered, hemorrhagic infiltration is the cause of hemorrhagic erosions, then for ulcus rotundum the same cause must be accepted. The difference between them is quantitative only and not qualitative. In the former case only the mucosa is affected, while in the latter the gastric juice acts also upon the submucosa and muscular layers." In support of this view may be cited the fact that hemorrhagic erosions and true ulcers are often found together in the same stomach. Ewald[13] inclines to this for at least a portion of the cases. Gerlardt[14] furnishes examples of erosions changed into true ulcers.

It is difficult to explain the occurrence of ulcers in the first few days of life on any basis other than that during parturition a hemorrhage into the mucosa has taken place and been followed by autodigestion. An infectious origin in children is indicated by the occurrence of gastric ulcer in children dying of tuberculosis, typhoid fever, pneumonia, noma, diphtheria, and empyema (2 cases). Ewald looks upon the bacteria as causal in a mechanical rather than toxic manner. He cites the observations of Nauwerk, Letulle, Dieulafoy, Stokes, and Kraft, who found emboli consisting of masses of bacteria closing up the smallest vessels of the mucosa. These are supposed to give rise to circumscribed disturbances in the nutrition of the mucosa followed by necrosis.

One acute case was evidently of traumatic or infectious origin following severe burns of the arms and legs.

SITE OF THE ULCERATION. With the addition to Cutler's statistics of several recent cases in which histories could be obtained, acute ulcers are found as often at the cardia as at the pylorus. They were midway between the two openings in two, and generally distributed in two. In chronic cases there appears also to be no special predilection of site. Multiple ulcers widely separated are frequent.

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[12] Cited from Hemmeter's Diseases of the Stomach.

[13] Deutsche Klinik, p. 459.

[14] Virchow's Archiv., Band cxxvii, p. 85.

SYMPTOMS. These have been obtained from only some of the cases, the reports being inaccessible in some cases and deficient in others. In infants gastric symptoms are as a rule absent, indefinite, or masked by those of an infectious disease, a sudden hemorrhage, or pain from perforation, being the first evidence of the presence of ulcer. In a number of cases the ulceration was an unexpected pathological finding. In older children the symptoms are similar to those in adults, but seem to be milder. Excepting immediately preceding perforation, in but one case was the pain severe.

Pain and tenderness were noted in but 13 per cent. of the acute cases; but were present in over 60 per cent. of the chronic cases. The pain was usually not severe. In those cases in which the patients were able to impart information, it was localized in the epigastrium. In young children it seemed over the entire abdomen. In all cases it came on in paroxysms, occasionally before, but more usually after meals, and was relieved by vomiting. Intense pain was followed by hematemesis or perforation.

Vomiting. In the acute cases in infants, vomiting was usually subsequent to diarrhœa. In older children it followed epigastric pain and relieved the distress. In cases accompanying follicular gastritis, vomiting was persistent. Fenwick mentions the finding of minute pieces of mucous membrane in the vomit in cases of gastric erosions.

Hematemesis was noted in 40 per cent. of the cases in which histories were obtained. It was bright red and varied from a few streaks in the vomited material to a quart(?). In 4 acute cases it was the immediate cause of death; the stomachs were found filled with blood. In chronic cases the hematemesis was preceded by epigastric pain. In the acute, pain was often absent.

Symptoms of Indigestion. Anorexia, fulness, and distension, nausea, or heartburn were seldom complained of. Excepting acute cases, they were noted only in the chronic cases.

Stools. Diarrhœa was a prominent symptom, being present in almost one-half the acute cases. It usually preceded vomiting. Constipation was at times followed by diarrhœa. Melena was noted in the majority of cases of hematemesis. I have not been able to find a case in which it completely replaced hematemesis, although it is mentioned as a possibility, by Fenwick. Occult bleeding was, with the exception of my case, not noted.

Fever was noted in a considerable number of cases, running in infants as high as 106°. Cutler reports a temperature of 102° in a girl of six years and 101° in a child of eight.

Blood examinations were made in but 2 cases. Both were anemic. Hemoglobin, 75 per cent., and 60 to 85 per cent. In one the leukocyte count was normal; in the other, 25,000 to 27,000.

COMPLICATIONS. A striking feature of acute ulcer in children is the large percentage of *perforations*. In 18 cases in which autopsies were made perforation was found in 6, or 33 per cent. In 8 fatal cases of chronic ulcer it was present in 3, making a total of 9 cases of perforation in 26 fatal cases. The symptoms are sharp, sudden pain in the abdomen, vomiting and collapse. Death occurs within thirty-six hours. This complication is not infrequently the first indication of ulcer. In older children, symptoms of the complicating peritonitis are sometimes seen, as in adults; but in young children collapse with rapidly fatal termination is the rule. Bisset has recently reported a case of perforation in which the initial symptom was profuse hemorrhage. In 1 case, perforation of the diaphragm occurred with subsequent pyopneumothorax. In Chvotek's[15] case stenosis of the pylorus and dilatation of the stomach is recorded. The base of an ulcer had formed adhesions with the pancreas, and contracted narrowing the pylorus so that it would hardly admit the tip of the little finger. Krasnobayeff,[16] reports 3 cases of stricture of the pylorus in children.

Robinson[17] reports a case of chronic ulcer in a boy of fourteen years, in whom autopsy showed two strictures of the œsophagus with a diverticulum. The stomach was markedly contracted in size and the pylorus thickened and constricted. At the pylorus was a large ulcer almost encircling it. The mucosa was replaced by fibrous tissue to which the contracture of the stomach was probably due.

DIAGNOSIS. In those cases in early infancy in which the first symptoms are profuse hemorrhage or collapse from perforation, early recognition is obviously impossible. In older children the symptoms are usually so little distinctive, and the disease of such uncommon occurrence that the diagnosis must depend largely on the finding of blood in the vomit and stool. And here care must be taken to eliminate the many other causes of hematemesis and melena. Thus in Dusser's 24 cases of hemorrhage from the stomach and intestines, in only 13 was ulcer found. In infants the blood may rise from the gums, nose, throat, or lungs, and be swallowed, followed by vomiting. Blood may be sucked from the breasts of the mother, or, in neonats, have been swallowed during parturition. True hematemesis arises from a number of causes other than ulcer. It has been observed in purpura, hemophilia, scurvy, and similar diseases in which there is a tendency to bleeding from any of the tracts. Cirrhosis of the liver, a not very uncommon condition in children, may give rise to it. In malignant forms of the exanthemata, notably measles and variola, it is likely to occur. I have seen it in a case of influenza. Other causes are: corrosive poisoning, severe retching (as may occur in pertussis), and traumatism as due to swallowing of foreign bodies. The great majority of these can be eliminated with a little care. In cases of melena the elimination of other causes presents greater difficulties. It is present in practically all cases of hematemesis, either as visible or occult hemorrhage. The importance of its recognition lies in the possibility of it completely replacing the vomiting of blood. In addition to the causes already mentioned as producing hematemesis, the possibility of intestinal origin must be considered. These are ulceration of the bowel due to catarrhal enteritis or colitis, tuberculosis, and typhoid fever; further, intussusception, thrombosis of the mesenteric artery, intestinal parasites, rectal polyps, hemorrhoids, and straining at stool. In neonats, melena frequently occurs without discoverable cause.

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[15] Archiv. f. Kinderheilkunde, 1882, vol. iii, p. 267.

[16] Dietsh. Moskau, 1898, iii, p. 195.

[17] International Clinics, 1905, 15, s. iii, p. 119.

It is not unlikely that, with the attention now being devoted to the recognition of occult hemorrhage, curable ulcer of the stomach will be more frequently recognized in children suffering with chronic stomach disorders.